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In this way, if the observation that after the removal of the old timber in Nevada the water-flow was more even be correct (which I hesitate to accept), it would find explanation in this, that the stumps and roots decayed and thereby increased the channels for the percolation of surface waters.

In conclusion I would say, that geological structure and soil conditions may be such, that percolation takes place readily even without the additional aid of a forest growth, when the effect of the latter may become irrelevant, although as a rule it may be accepted as a result of forest removal and exposure of soils, when new growth is at the same time prevented by fires and by sheep herding, that all soils become gradually more compact and less penetrable; that then more water goes over the surface and less remains for subdrainage and that ultimately the change is felt in the riverflow.

B. E. FERNOW.

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ZOOLOGY AND BIOLOGY.

TO THE EDITOR OF SCIENCE: It is astonishing to find in your columns the assertion, p. 634, that the Johns Hopkins University sends out 'Doctors of Philosophy in Biology,' for you might have learned so easily that no such degree is known among us.

The examining board recommends for the degree of Doctor of Philosophy those students who have satisfactorily completed a course of study which this board has previously approved; and among all those who have been recommended for this degree during the last twenty years not a single one has presented himself for examination in biology, although many have been examined in various branches of biological science.

W. K. BROOKS,

Professor of Zoölogy in the Johns Hopkins University.

BALTIMORE, April 28, 1896.

[The criticism of Professor Brooks is directed against a letter signed by Professor Conway MacMillan, of the University of Minnesota. SCIENCE is not responsible for the opinions of its correspondents. ED.]

THE USE OF THE TOW-NET FOR COLLECTING PELAGIC ORGANISMS.

EDITOR OF SCIENCE: I have so frequently seen the first use of the tow-net as a means for collecting pelagic organisms placed to the credit of Johannes Müller that I suspect many zoölogists are, as I was till recently, ignorant of the fact that Eschscholtz employed the apparatus some twenty years earlier than Müller did.

In Eschscholtz's 'Review of the Zoölogical Collection,' appended to the second volume of 'A new Voyage round the World,' by Otto von Kotzebue, I find the following on page 327: "The calms near the equator afford an abundant harvest to the zoölogist, the tranquil water presenting an immense variety of marine animals to his view, and allowing him to take them with little trouble in a net. The open woolen stuff used for flags offers the most convenient material for making these nets, as it allows the water to run through very quickly and does not stick together. A short wide bag should be made of this stuff, which may be stretched upon the hoop of a cask, and the whole fastened to a long, light pole. From the height on which we stand above the water it is impossible to perceive the smaller animals; the best way, therefore, to catch these is to hold the net half in the water, as if to skim off the bubbles of foam from the surface; then, after a few minutes, if the net is drawn out, and the interior rinsed in a glass of fresh seawater, one may frequently have the pleasure of seeing little animals of strange forms swimming in the glass. In the course of ten days I obtained, in this way, thirty-one different species of animals."

Eschscholtz does not tell us exactly when he began this kind of collecting; but the voyage on which he did it was during the years 1823, '24, '25 and 26; and as the above quotation is taken from the account of his observations in the tropical Atlantic before reaching the coast of Brazil, it certainly relates to the earlier part of the voyage.

In the last one of his series of papers on the development of Echinoderms, published in 1852, Müller tells us that he had used the tow-net 'vielen Jahren mit dem besten Erfolge.' The 'vielen Jahren,' I suppose, refers to the years during which he was prosecuting his beautiful

researches at Heligoland, Trieste and Marseilles, and these he began in 1845.

Very likely other zoölogists as well as Eschscholtz used the tow-net before Müller. One can hardly see how an ardent collector of marine animals could have escaped resorting to something of the kind, even though he had never before seen such a thing.

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SCIENTIFIC LITERATURE.

The Principles of Sociology. By FRANKLIN H. GIDDINGS. Pp. 476+16. Macmillan & Co., New York. 1896.

Sociology has had a checkered and disappointing career. Its study began not because there was a body of men ready to devote their energies to its advancement, but because certain system makers found what they supposed to be a vacant field to which some attention must be given. The men who have done the most from this point of view are Comte and Spencer, though the main interest of neither lay in the development of this field. For these philosophers 'sociology' became the depository of the odds and ends of thought for which no other convenient place could be found. It is needless to say that such a method failed. The creators of a science must live in it, and with this condition these system-makers did not comply.

This new field, this land along the edge of which Comte and Spencer sailed, supposing it to be unoccupied, had residents and tillers. Its aboriginal inhabitants were called economists and, even though not recognized by the system-makers, had really created a science. It is not to be claimed that the whole field was cultivated or even that the occupied portion was cultivated to the best advantage. But work of a permanent character had been done and, at the same time, public opinion had been reconstructed in many important respects. It is the fulfilment of these conditions that justifies the claim of any science.

The second attempt to found a sociology grew out of the shortcomings of these economists. Those who resisted the narrowing tendencies of the definite creed formulated by the economists

found sociology a convenient name and took it to designate their field. But the latter were moved too largely by their sympathies to be scientific workers, and their energies were spent more in denouncing the hard-hearted economists than in formulating better laws. Sociology with them remained, as with the system-makers, a dumping ground for the crude doctrines and rubbish rejected by the economists. Such work and such men could scarcely found a science.

To neither of these causes is due the new American sociology. Professor Giddings is not a wandering philosopher looking for a job, nor is he an outcast economist of the soft hearted variety. Among economists no one has a better reputation. By his good work he has earned a place in their ranks and he leaves them with their hearty good will. The cause of the new movement lies not in personalities nor quarrels, but in conditions—conditions that can be made plain only by a restatement of the history of economic thought.

The science of economics is a product of Eighteenth Century rationalism. By the philosophers of the last century it was assumed that man was a reasonable being. Customs, habits, national feelings and the like were thought to be remnants of past conditions, due to the oppression from which the race still suffered. Conscious calculation should be the only guide; expediency the only rule of action. Each decision was to be made by a summing of utilities. The free man should have only two masters, pleasure and pain.

With such premises the social sciences could be divided into only two parts, economics and utilitarianism. Economics treated of the material sources of pleasure, the influence of the environment on their production and the pains which this production involved. The older forms of ethics, politics and law were to be displaced by utilitarianism, thus including within its scope all decisions where the pleasures and pains were immaterial. Welfare reckoned in material goods was economics; welfare reckoned in units of pleasure was utilitarianism. No rational being should consider other motives, and in time they would disappear through the elevation of the race. While this distinction